LINEX SCRIBER

Programming Manual

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A.D.S./Linex, Inc.

Scriber Programming Manual

Introduction

To program your Linex Scriber, you do not need to know any particular computer language, such as basic, fortran, etc. The programming of the Scriber is point-to-point based on an X/Y grid. Programming is very simple in that you have four basic commands; namely up, down, stop and move or U, D, S and M. As you work through this section, you will learn how to use these commands. All programming is done in memory; therefore the commands you learned for storing, recalling, editing, etc. are all used when programming.

This lesson on programming is rather lengthy, and is broken into various sections. In each section are actual programs and instructions for you to do on your Scriber so that you can learn as you progress through each part.

A breakdown of the various sections follows:

Section 8.1	Credits
Section 8.2	X-Y Grid
Section 8.3	Absolute Movement
Section 8.4	Accessing the Programming
Section 8.5	Programming a Box/Straight Lines
Section 8.6	Programming Diagonals
Section 8.7	Programming Circles and Quarter Circles
Section 8.8	Programming Arcs
Section 8.9	Programming Text and Symbols Together
Section 8.10	Listing Your Programming Steps on Paper
Section 8.11	Summary
Section 8.12	Conclusion
Section 8.13	Appendix of Sample Programs

As you are learning programming, should you have any questions or encounter any problems, please feel free to call us.

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VIII. Lesson 8. Programming

8.1 Credits.

As you proceed through this section, you will be referenced to various programs in the appendix. Review these programs to see other ways of using lines, circles, diagonals, arcs and text.

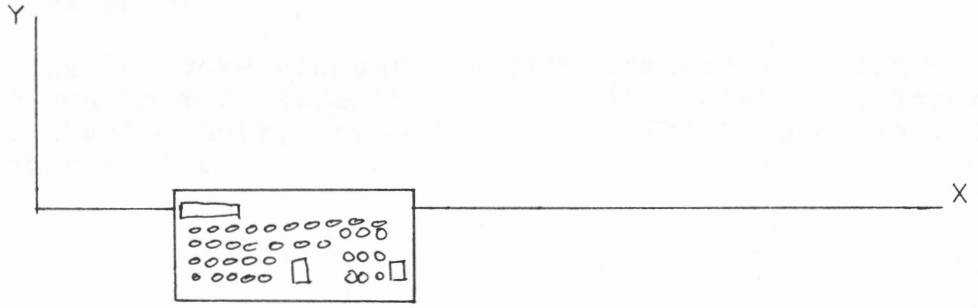
You will note that some of the programs have been written by our customers, and where appropriate we have referenced them. We encourage you to send us copies of your unusual programs so that we can share them with others.

SPECIAL NOTE

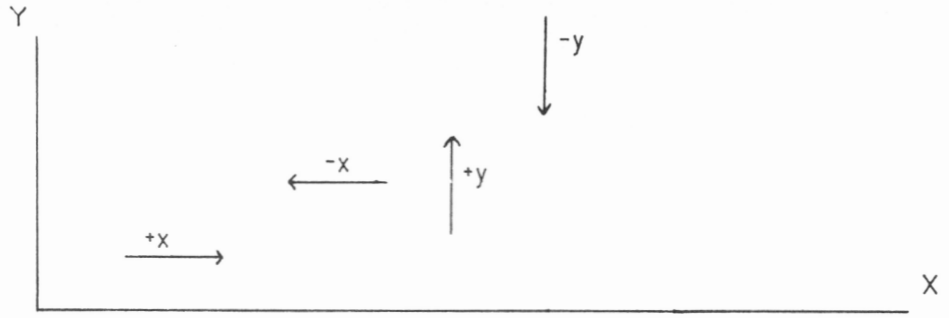
This manual was designed primarily for an 802 Scriber. If you are using an 803 Scriber, please note the following changes: while the programming manual does not specifically instruct you to press the second (STO) or (RCL) key when storing or recalling, you must press them after the register number is entered. You will recall doing this in Chapter 6, Permanent Storage, Linex Scriber Training Manual.

8.2 X-Y Grid.

Remembering your basic algebra, the X axis is the horizontal and the Y axis is the vertical. For example, when having your Scriber attached to a drafting arm, the Scriber ruler is the X axis, and the scale on the drafting arm is the Y axis.



Any horizontal movement from the left to the right is a +X command. Similarly, any horizontal movement from the right to the left is a -X command. Identical commands follow in the Y direction; that is, any vertical movement going away from the Scriber's scale is a +Y command, any vertical movement going toward the Scriber's scale is a -Y command. Observe the drawing. These +X, -X, +Y, -Y commands will always be used as the means of programming directions.



Remembering the Scriber's boundary limitations of 10 inches by 2 inches, you are not able to program anything larger. You might note that you cannot even program anything 10 inches by 2 inches, rather your limitations are 9.8439 inches by 1.969 inches.

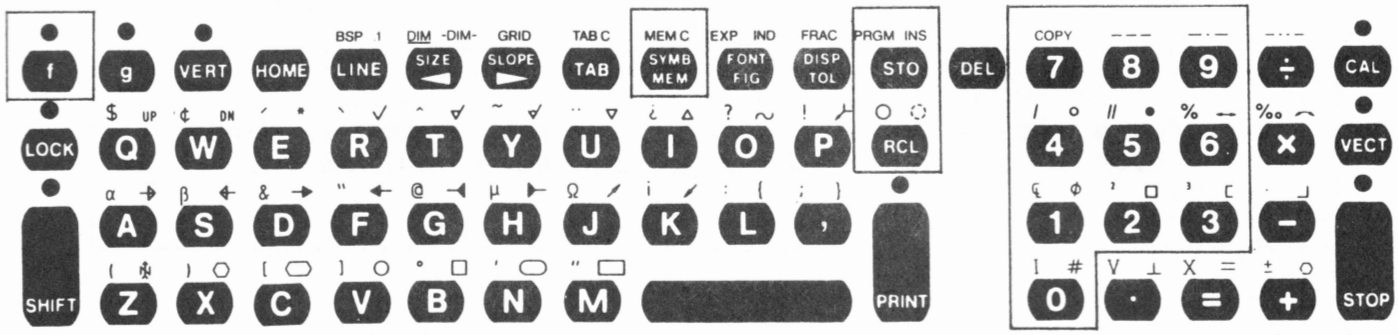
8.3 Absolute Movement.

The absolute movement is used for positioning the pen in the drawing field away from the boundary area. It is good practice to start every program with a move command so that you can position your pen away from the lower left hand corner. A move command is indicated in the program as M.

Following the move command, a stop command is recommended. This will enable you to make sure the Scriber is properly positioned before writing your text, note, symbol, etc. The stop command is written into the program as S.

8.4 Accessing the Programming.

Let's begin to program. The keys needed for programming are highlighted below.



Initially, you must access the memory because programming can only be done if you have some place to store it. As you will recall from Lesson 6 on Permanent Storage, you access the memory by pressing the (MEM) key. You can store your newly created program either in internal memory (USER MEM No 0 [zero]), or in external memory cartridges (USER MEM No 1, 2, 3 or 4).

Once accessing the memory, you have three choices: storing, recalling or leaving. To program the Scriber you first will want to (STO) ; therefore, press (STO) and the register number in which you desire the program to be stored. For our lesson we will store in register 10.

Once you have pressed the register number, you will need to access the programming function. The programming key is (f) -mode above the (STO) key and is labeled (PRGM) .

If you have not already accessed the programming, please do so. Again, the step-by-step instructions are:

(lower case)	MEM
	USER MEM No 0
	STO
	MEM STO NO 10
(f-mode)	f PRGM (actually accessing PRGM)

Notice the display. It should show PG10 which signifies the Scriber is ready for programming.

When programming, the Scriber always prompts you with line numbers in increments of 10; that is line one will be shown as 10, line 2 will be 20, line 3 will be 30, line 50 will be 500, and so on. Always remember that you program one command per line and leave no spaces in the command sequence. Following each command sequence, push the (LINE) key to tell the Scriber you are finished with that line and are ready for the next. At the end of the last line of your program,

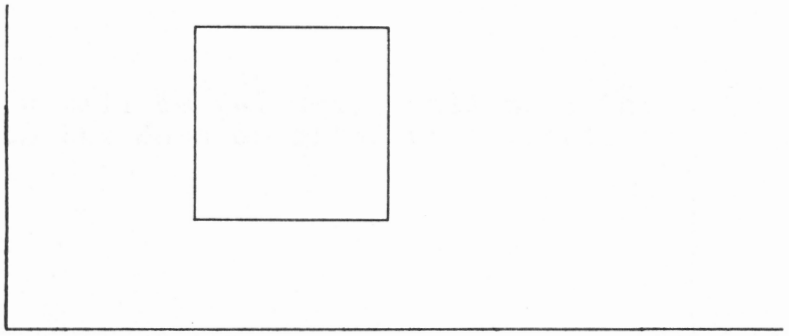
you will need to exit the programming function by simply repressing (f) (PRGM) . The display will show a PG at the end of the program. Finally, you will need to press the (STO) key. You press the (STO) key to tell the Scriber you have completed the programming and are ready to store it in the designated register. In this case, the register will be 10.

> Before we begin programming the Scriber, always remember: the Scriber does exactly what it is told to do!

8.5 Programming a Box/Straight Lines.

Since we are ready to begin programming, let's start with something basic, such as a box. We will want to program a 1-inch box, 1 inch away from the X axis and 0.5 inches away from the Y axis.

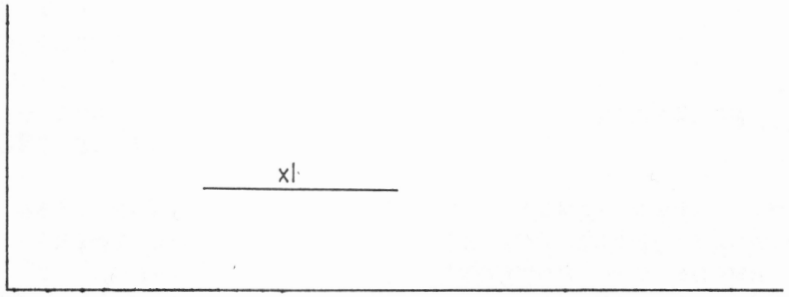
Observe the diagram.



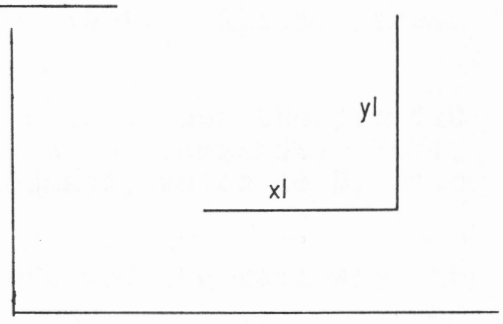
The first command to program will be an absolute movement command of X=1 inch and Y=0.5 inches. The actual command you type on line PG10 will be MX1Y.5 (leave no spaces in the command sequence).

Next do a line command by pressing (LINE). The (LINE) symbol ↵ will be shown in the display. Observe the display and note 20 will appear. This indicates line 20 of the program. You should program a stop command next just to ensure that the Scriber pen is positioned where you want it. Line 20 will then be S. Note that the "S" can be either capital or small lettering. Again, do a (LINE) command.

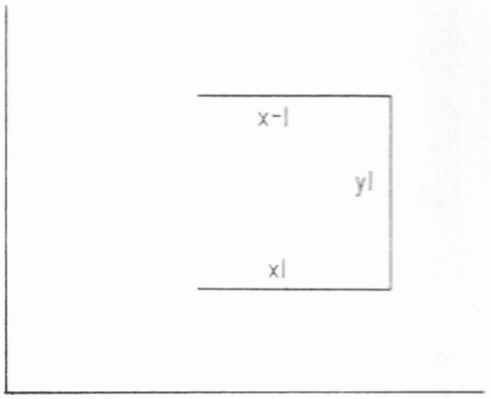
We are ready to give the Scriber instructions to draw the box. Line 30 will be X1 which tells the Scriber to move 1 inch to the right or 1 inch in the positive horizontal position.



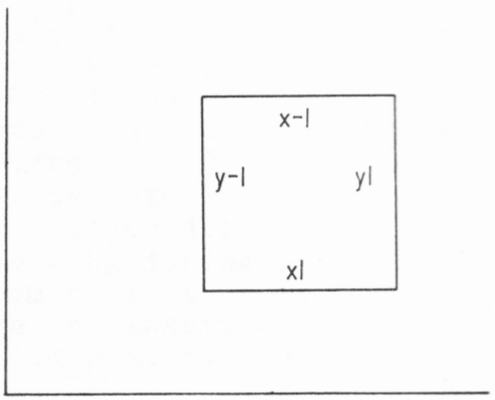
Line 40 will be Y1 which will move the pen 1 inch to the up or positive vertical position.



Line 50 will be X-1 which will move the pen 1 inch to the left or in the negative horizontal position. The key used to program the - sign is the minus sign found next to the number 3 key.



Line 60 will be Y-1 which will move the pen 1 inch to the down or negative vertical position.



Since we have just completed giving the Scriber four lines in four positions, we should be through with our program. We are, so let's end the program by pressing (f)-mode (PRGM) . Notice the display. When ending a program with a (f)-(PRGM), the display will show a PG at the end of your last line.

The programming steps are:

```
PG10 MX1Y.5
20 S
30 X1
40 Y1
50 X-1
60 Y-1PG
```

(STO) the program into register 10 by pressing (STO). You should observe MEMORY in the display.

Let's see how successful we have been in our programming attempts. Making sure your pen has ink flow, push (RCL) register 10. The first 16 characters of our program are shown in the display. Press (PRINT) and note the display: Reg-No 10 100%. Again, press (PRINT) and watch the Scriber draw your box.

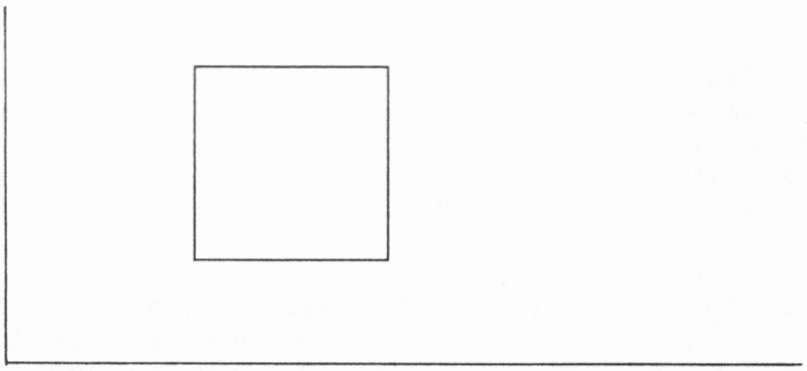
Ahh! The pen moved as if it was drawing a box, but the pen did not go down. We never told the pen to go down in our commands. Well, no problem. Let's just insert the pen down command, which is D, into our program.

Inserting a command into a program is performed the same way it

is performed in memory, since programming is another branch of memory.

The step-by-step instructions are:

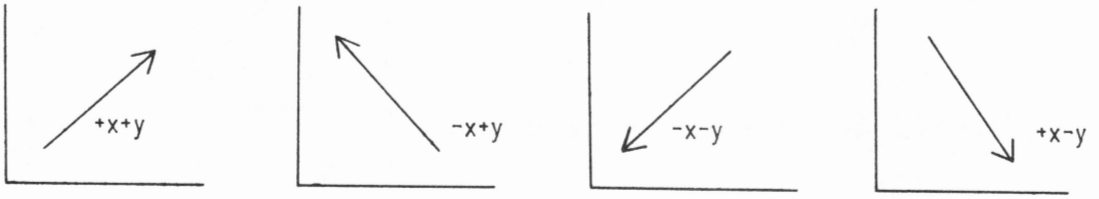
RCL 10
E for edit, and use the arrow keys on SIZE and SLOPE to move through the program. Note, the Scriber must be in lower case to access the arrow keys. Stop at the line command before the 30.
g INS Line 25 space d
You must press the LINE key and type 25, space, then type d. Between each set of 10 lines of program, you can insert 9 lines of programming. For example, we need to insert a pen down command between lines 20 and 30. Consequently, we scanned our program until we came to the line command before 30, and inserted ↵ 25 D. Note that we could have inserted line 21 through line 29, but we arbitrarily selected line 25. A major difference, as you may have noticed, between inserting during a program operation and inserting through memory is that you must specify a line and number it before you insert a program command. Otherwise, the insertion procedure using the INS and STO commands are the same.
STO Notice the display shows MEMORY.
RCL 10 Commands used to print out box.
PRINT
You should print a 1" x 1" box:



You have just learned programming basic straight lines. The next section will cover diagonal lines.

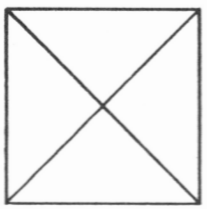
8.6 Programming Diagonals.

Diagonal lines are programmed using both X and Y in the same command. Observe the four diagrams below to understand the dual direction of the pen movement. Once you fully comprehend the movement commands, please continue with the instructions. The X command must be the first command in a dual direction command.



You will recall that drawing diagonals is done by dropping perpendicular lines to the baseline and measuring their lengths. The width of the line will be the X command number. Similarly, the height of the line will be the Y command number.

Let's go back to the box you previously programmed. The objective is to change the program so that you will draw a box with an X in it. Observe the picture:



The program you will start with is the shell of the box. By entering the edit mode, you can space over the entire program. When you have spaced to the end, which is designated in the display as PG, simply press the PRGM mode and continue on with the new program. Again noting the display, you should have PGPG10- with a blinking cursor.

Numerous programs can be strung together in one register. Reference Oil Well in Appendix. From our example, you are beginning your second program in register 10. Before instructing you on the next program, you should note at the end of every program by default, the Scriber automatically executes a pen-up command. Therefore, remember to insert a pen-down command into the next program.

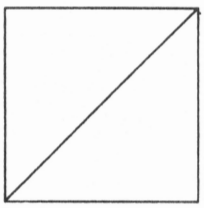
The box is 1" x 1", therefore, the X-length of the diagonal line will be 1" and the Y-height of the line will be 1".

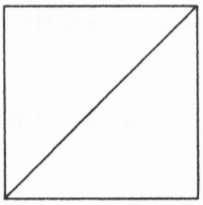
The step-by-step instructions are:

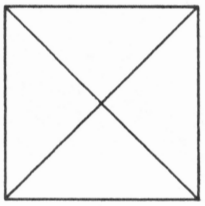
```
PG10 D
20 X1Y1
30 X-1
40 X1Y-1PG
```

The actual pen movements are:

10 D — Pen goes down.

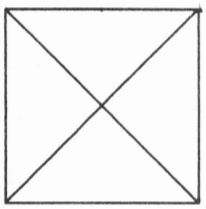
20 X1Y1  Pen draws 1st diagonal from lower left-hand corner of square to upper right-hand corner of square.

30 X-1  Pen will draw over top line.

40 X1Y-1  Pen draws final diagonal from upper left-hand corner of square to lower right-hand corner of square. Also, pen moves to a pen-up position.

You will need to press (STO) to let the Scriber know you have completed your program. Let's (PRINT) the box with the X so you can see how successful you have been at programming.

If you have not already done so, press (STO), (RCL) register 10. (PRINT) and observe:



If you fully understand the programming commands we used, then continue on with the instructions. Be assured that we will confuse you if you do not understand the previous program.

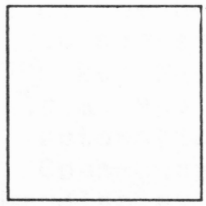
There are numerous ways to program everything. With our simple square, you can start at any corner and begin the program, as long as your absolute movement command coincides with your starting point. In our example, you could begin at the upper right hand corner and draw the box from top to bottom.

The program could be as follows:

```
PG10 MX2Y1.5
20 S
30 D
40 Y-1
50 X-1
60 Y1
70 X1PG
```

STO
RCL other commands to print the box.
PRINT

Again, you should print the following box:

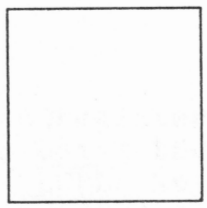


Now that you understand the various possibilities of programming the same symbol, you will be shown another example. When the diagonal lines were programmed into the box, we added a second program in the the same register. Therefore, the first program drew the box, and the second program drew the X. We could have inserted the X program into the box program. Let's proceed and do so.

First, program the box into register 20. Again, the program commands are as follows:

```
STO Register 20
f PRGM PG10 MX1Y.5
20 S
30 D
40 X1
50 Y1
60 X-1
70 Y-1PG
STO
```

PRINT the box.



In order to add the "X" to the box, you need to enter the edit mode. To access this, press (RCL) register 20. Press (E) for edit (either capital or lower case). Remembering editing from the permanent storage chapter, you will recall the cursor moves under the first character and blinks. Keeping the Scriber in lower case, you can space over the program using the arrows on the (SIZE) and (SLOPE) keys. For this instance, space over the box program until you get to the end, designated by the PG shown in the display.

(DEL) the PG and type in a (LINE) command which will show in the display as ↵ . Type the number 80 and space one character. The next commands will be X1Y1, (LINE), 90 space X-1 (LINE) 100 space X1Y-1PG. Notice the display. Following the PG will be the number 10. This appears because when you access any register and you press the (PRGM) key for the first time, the Scriber thinks you are beginning a new program and automatically prompts you with the Line 10. Consequently, you need to leave the PG in the display and delete the number 10. To do this, simply press the (DEL) key three times. Finally, (STO) this program.

ADDING A SECOND PROGRAM THRU THE EDIT MODE

```
 70 Y-1
 80 X1Y1
 90 X-1
100 X1Y-1PG
```

Before you (PRINT) the program, a brief explanation of the programming commands is required. First, you must have the space after your program line numbers. If you do not, the Scriber will print whatever is correctly programmed and will stop on the line where the error occurs. Also, the display will indicate ERROR LINE ----, whereby the ---- represents both the line number and the first couple of characters of that line.

For example, if no space was left after the number 90, an error message in the display would be indicated as:

ERROR LINE 90X-

PROGRAM ERROR EXAMPLE

```
PG10 MX1Y.5
 20 S
 30 D
 40 X1
 50 Y1
 60 X-1
 70 Y-1
 80 X1Y1
 90X-1
100 X1Y-1PG
```

To correct the error, (RCL) register 20, press (E) for edit mode, and space through the program using the arrow keys located in the lower case of the (SIZE) and (SLOPE) keys. Stop at the X after the number for line 90 and press (g) (INS) to insert a space. Press the

space bar once, and since you are using a special function key, (Lesson 4 Linex Scriber Training Manual) you will need to press (g) (INS) to exit the special function. Since you have changed your originally stored program, you will need to press (STO).

A second error in programming might be that you inserted a space between the (LINE) and the number of that line. For example, observe the sequence shown here. Notice Line 80 is typed incorrectly, in that there is a space after the command. The Scriber memory cannot cope with this space and will show an error message in the display when trying to (PRINT) this program.

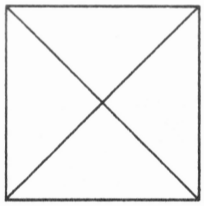
PROGRAM ERROR EXAMPLE

```
PG10 MX1Y.5
20 S
30 D
40 X1
50 Y1
60 X-1
70 Y-1
 80 X1Y1
90 X-1
100 X1Y-1PG
```

Note that when printing the program on paper, the (line command) does not print.

This error can be corrected through the (E) (edit) mode. Again space over the program using the designated arrow keys until the cursor is situated under the incorrect space. When the cursor is properly positioned, press the (DEL) key once to delete the extra space. (STO) the corrected program and (PRINT).

You should print the following symbol:



As you are aware, there are many ways to program the same symbol. There is no correct way or incorrect way to do any specific program. The best rule to follow is to program your symbol in the sequence that seems easiest to you. You might realize as you write more programs, you will find shortcuts which will eventually produce shorter programming command and use up less of your available memory.

Examples of using diagonals can be found in the appendix. Reference programs are: ribbon, oil well, triangle, cable mapping symbols.

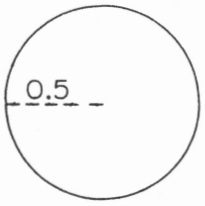
Proceed to the next section on programming circles.

8.7 Programming Circles and Quarter Circles.

Circles are indicated in the programming sequence as C. A full circle is drawn clockwise, whether it is from the X or the Y command. The circle X and/or Y command is equal to the circle's radius.

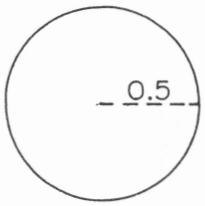
Study the four diagrams below to learn the circle commands.

Figure 1



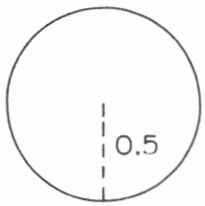
CX.5

Figure 2



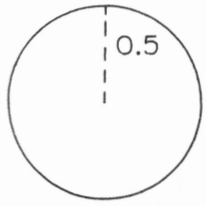
CX-.5

Figure 3



CY.5

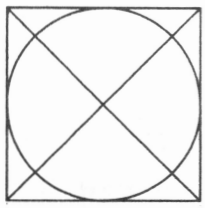
Figure 4



CY-.5

The maximum radius in programming is equal to 0.98 inches, yielding a circle with the diameter equal to 1.96 inches.

Again, using our box with the X programmed in register 10, the next step is to add a 1 inch diameter circle inside this box. The desired symbol should appear as follows:



Since we have added the X program separately from the box program in register 10, you will be instructed to add the third, or circle program separately. (RCL) register 10, (E)(edit), and space over the entire two programs. The Scriber will beep if you have tried to space past the last PG. At this point, start the new program for the circle by pressing (f) (PRGM). The PG indication will appear in the display, as well as the number 10 which is your line designator.

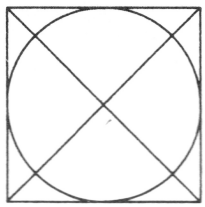
The program commands will be as follows:

PG10 D

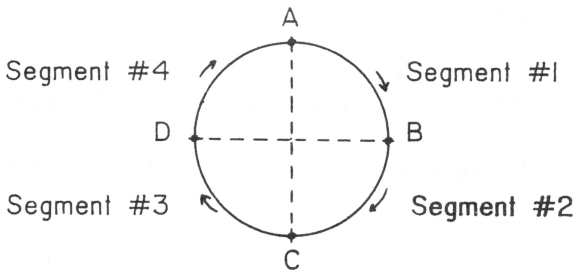
20 X-0.5 This command will move the pen to the left 1/2 inch, which is the midpoint of the 1 inch line. Since the pen is on the bottom line of the box, the circle will be drawn as indicated in figure 3 above.

30 CY.5PG The 0.5 is the radius of a 1 inch diameter circle. (STO) in register 10, (RCL) Reg. 10 and (PRINT).

Your new figure will appear as:



Quarter circles can also be programmed. By following the table and the diagram below, you can use the same commands for any quarter circle being drawn by changing the radii numbers to correspond with your needs.

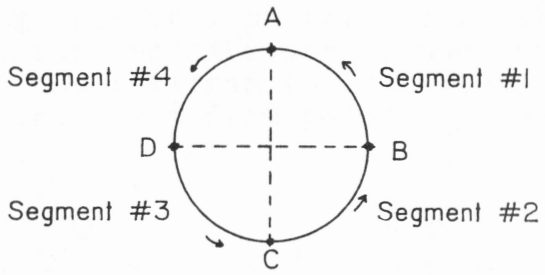


The heavy dots on the circle represents the starting point of the pen. Note, however, the pen does not actually draw the heavy dots. Also, the circle will be drawn in a clockwise rotation.

Segment	Command	Description of Command
Segment #1	CRX.5Y-.5	The pen draws from point A to point B.
Segment #2	CRX-.5Y-.5	The pen draws from point B to point C.
Segment #3	CRX-.5Y.5	The pen draws from point C to point D.
Segment #4	CRX.5Y.5	The pen draws from point D to point A.

By referring to the diagrams used for diagonal lines, you will notice that the X and Y commands follow the same sequence. The C part of the command lets the Scriber know it will be drawing a circle, and the R part of the command lets the Scriber know it will be drawing to the right or clockwise direction.

Quarter circles can also be drawn counterclockwise. Refer to the table and the drawing below for the commands needed to draw the various segments. Again, the heavy dots just represent the starting point of the pen and will not be drawn on your circle segments.



Segment	Command	Description of Command
Segment #1	CLX-.5Y.5	The pen draws from point B to point A.
Segment #2	CLX.5Y.5	The pen draws from point C to point B.
Segment #3	CLX.5Y-.5	The pen draws from point D to point C.
Segment #4	CLX-.5Y-.5	The pen draws from point A to point D.

For counterclockwise circles, the C in the command lets the Scriber know it will be drawing a circle, and the L in the command lets the Scriber know it will be drawing to the left. Again, the X and Y commands parallel the diagonal commands.

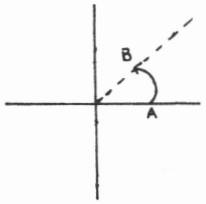
Programs to be referenced in the appendix include: Water conservation symbol, circles, bicycle, cable mapping symbols.

The next section provides instructions on drawing arcs.

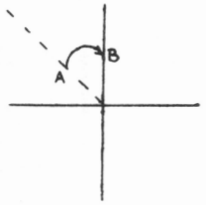
8.8 Programming Arcs.

As you are aware from the previous sections on programming, there already exists commands to draw full circles and quarter circles. The quarter circle command is the same as drawing a 90° arc. The instructions which follow deal with drawing arcs of less than 90°.

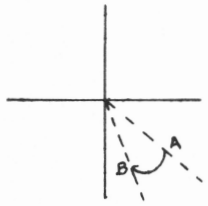
In drawing arcs of less than 90°, there are three possibilities. Diagrams and the descriptions of the three types are listed below. Study each of the drawings to learn the various possibilities. Note that the arcs are drawn from point A to point B.



Beginning the arc on one of the four axes.



Ending the arc on one of the four axes.



Arcs that neither begin nor end on one of the four axes.

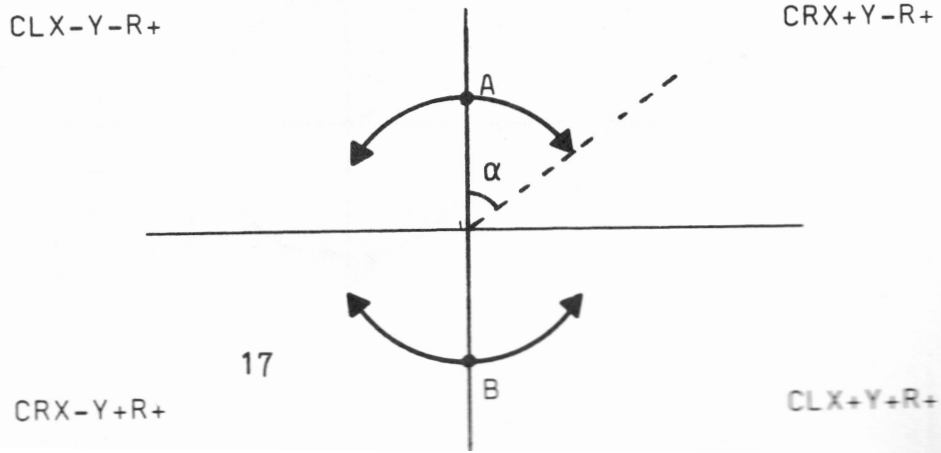
To draw any arc, the first step is to determine the type of arc you want to draw; namely, an arc beginning on an axis, an arc ending on an axis, or an arc between axes. Once the determination is made, go to the correct section and find the instructions on drawing the specific arc. Furthermore, in each section are eight types of arcs and the formula of the specific command you need to draw each particular arc. The + or - after the X or Y indicates the sign of the value for X or Y. To calculate the value of X and Y, use the formulas and equations shown. Also included is a table which provides the values for the sines and cosines of various angles.

The instructions for the three types of arcs are shown first, and two examples are shown at the end of this section.

Section I. Circular Arc <u>Beginning</u> On An Axis.

A. Arcs beginning on the Y axis.

whether clockwise (CR) or counterclockwise (CL) starting from point A or point B.

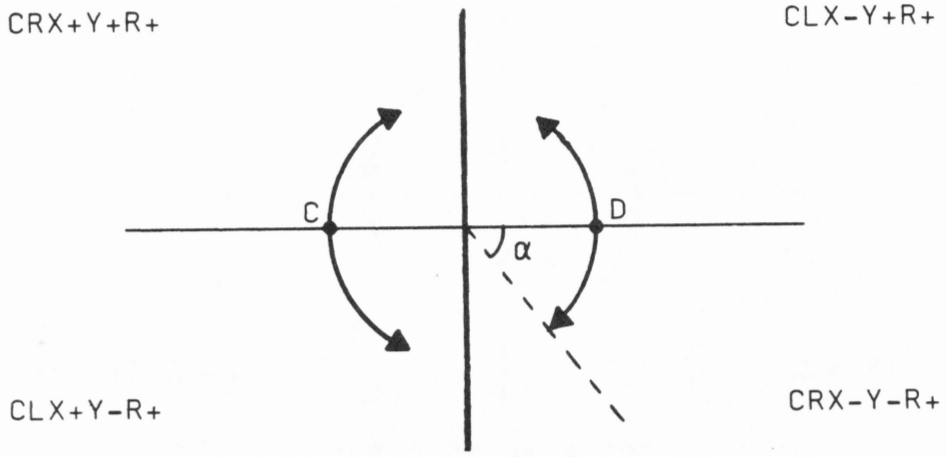


$\angle \alpha$ is the angle between point A or B and the terminating point.

R=RADIUS X=SIN $\alpha \cdot$ R Y=R-(COS $\alpha \cdot$ R)

B. Arcs beginning on the X axis.

whether clockwise (CR) or counterclockwise (CL) starting from point C or point D.



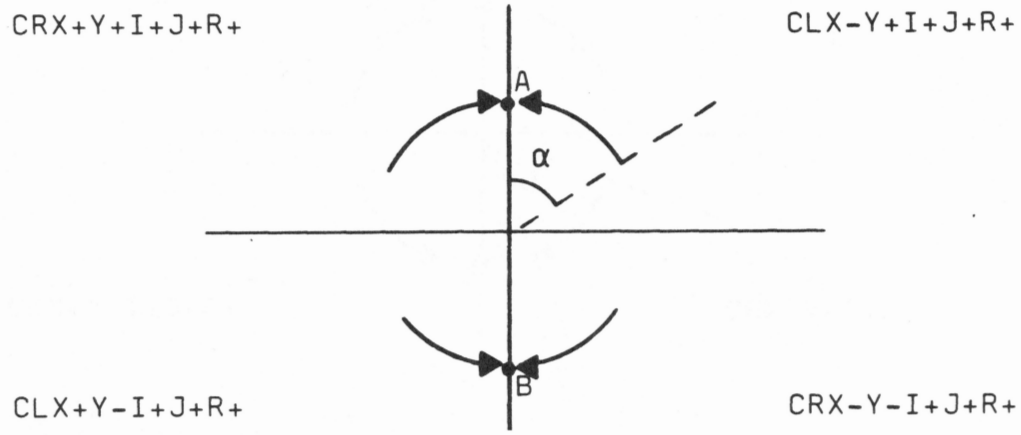
$\angle \alpha$ is the angle between point C or D and the terminating point.

R=RADIUS X=R-(COS $\alpha \cdot$ R) Y=SIN $\alpha \cdot$ R

Section II. Circular Arcs <u>Ending</u> On An Axis.

A. Arcs ending on the Y axis.

whether clockwise (CR) or counterclockwise (CL) ending at point A or point B.



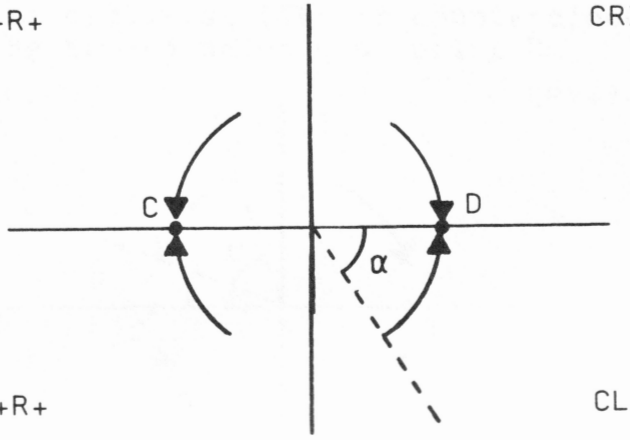
∠ α is the angle between the starting point and the terminating axis.

X=SIN α · R I=X R=RADIUS Y=R-(COS α · R)
J=R-Y

B. Arcs ending on the X axis.

whether clockwise (CR) or counterclockwise (CL) ending at point C or point D.

CLX-Y-I+J+R+ CRX+Y-I+J+R+



CRX-Y+I+J+R+ CLX+Y+I+J+R+

∠ α is the angle between the starting point and the terminating axis.

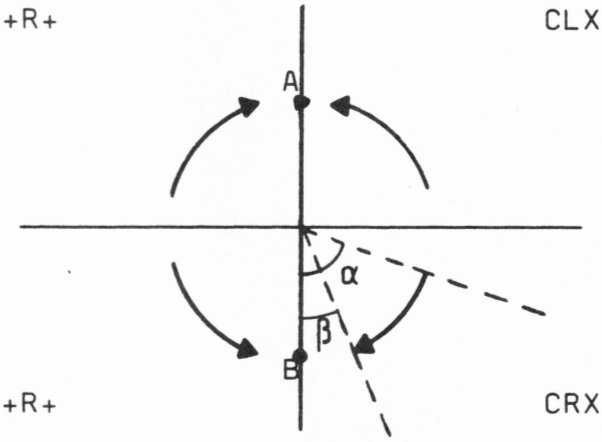
X=R-(COS α · R) I=R-X R=RADIUS Y=SIN α · R
J=Y

Section III. Circular Arcs <u>Between</u> The Axes.

A. Arcs going toward the Y axis.

whether clockwise (CR) or counterclockwise (CL) heading toward point A or point B.

CRX+Y+I+J+R+ CLX-Y+I+J+R+



CLX+Y-I+J+R+ CRX-Y-I+J+R+

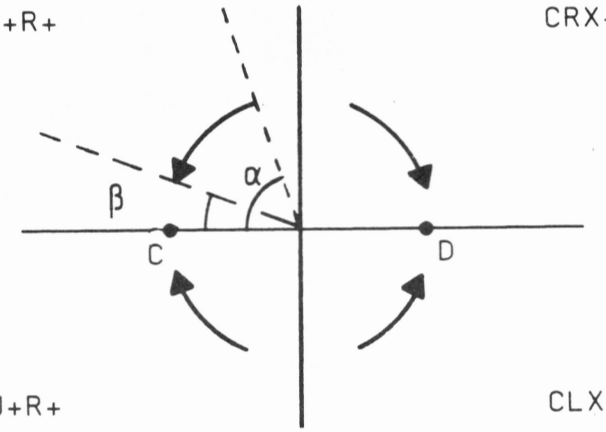
$\angle\alpha$ is always greater than $\angle\beta$ and equals the angle between starting point and terminating axis.

X=(SIN α · R)-(SIN β· R) I=SIN α · R
Y=(COS β · R)-(COS α· R) J=COS α · R

B. Arcs going toward the X axis.

whether clockwise (CR) or counterclockwise (CL) heading toward point C or point D.

CLX-Y-I+J+R+ CRX+Y-I+J+R+



CRX-Y+I+J+R+ CLX+Y+I+J+R+

$\angle\alpha$ is always greater than $\angle\beta$ and equals the angle between starting point and terminating axis.

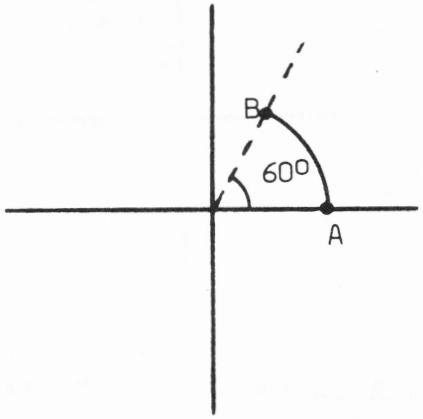
X=(COS β · R)-(COS α · R) I=COS α · R
Y=(SIN α· R)-(SIN β · R) J=SIN α · R

Conversion Table for Sines and Cosines of Various Angles

Angle (Degrees)	SIN	COS
5	.087	.996
10	.174	.985
15	.259	.966
20	.342	.940
25	.423	.906
30	.500	.866
35	.574	.819
40	.643	.766
45	.707	.707
50	.766	.643
55	.819	.574
60	.866	.500
65	.906	.423
70	.940	.342
75	.966	.259
80	.985	.174
85	.996	.087
90	1.000	.000

Two examples on drawing arcs follow. Note that you will be referencing the previous instructions to determine which equations you need to use.

Example 1:



TO DRAW THE ARC THAT STARTS AT POINT A AND GOES TO POINT B.

Since the arc is beginning on an axis go to the section labeled "Circular Arc Beginning on an Axis." After looking at the eight possible arcs, we find the one we want has the following format:

CLX-Y+R+

To calculate the values of X and Y and assuming a radius (R) of 1.0 inch, use the following formulas:

$X=R-(\cos \alpha \cdot R)$
$Y=\sin \alpha \cdot R$

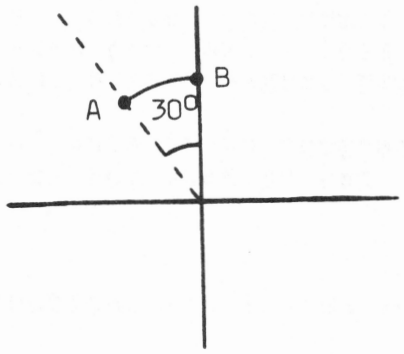
Given $\angle \alpha = 60^{\circ}$, then $\sin \alpha = .866$ and $\cos \alpha = .500$ and therefore,

$X=1.0-(.5 \times 1.0) = 1.0 - (.5) = .5$
$Y=.866 \times 1.0 = .866$

and the command to type in the Scriber would be:

CLX-.5Y.866R1.0

Example 2:



TO DRAW THE ARC THAT STARTS AT POINT A AND ENDS AT POINT B.

Since the arc is ending on an axis, go to the section labeled "Circular Arc Ending On An Axis." After looking at the eight possible arcs, we find the one we want has the following command:

CRX+Y+I+J+R+

To calculate the values of X, Y, I, J, use the following formulas:

X=SIN α · R
Y=R-(COS α · R)
I=X
J=R-Y

Given $\angle \alpha = 30^\circ$ and R =.5, we can calculate:

X=.5 · .5 = .25
Y=.5-(.866 · .5) = .067
I=.25
J=.5 - .067 = .433

and the command to type in the Scriber is:

CRX.25Y.067I.25J.433R.5

Note: the programs in the appendix: Large north arrow, other north arrow, interstate sign.

8.9 Programming Text and Symbols Together.

Text and symbols can be programmed into the same register, although not into the same program. This is particularly useful when programming title blocks, street signs, pole or corner markers, etc.

A simple example of this is to program a box and then put a label inside the box. Access register 30 and type in the program for the box.

The command instructions are listed below:

(STO) Reg. 30
(f) (PRGM)
PG10 MX1Y.5
20 S
30 D
40 X1
50 Y1
60 X-1
70 Y-1
80 U
90 X.3Y.45PG

An explanation of these commands is required. The pen up command (line 80) is necessary so that you can move the pen to the desired location, without drawing any unwanted lines. The command on line 90 is the actual pen movement command. You need to end the program at this point, because while programming, the Scriber does not recognize anything other than X, Y or any letter of the command letters (which are U [up], D [down], S [stop] and M [move]).

BOX
(STO)
(RCL) Reg 30 (PRINT)

Before pressing (PRINT), make sure the (SIZE) of your lettering is 0.138.

Lesson 6 Permanent Storage (Linex Scriber Training Manual) taught you how to program text into permanent memory. To program the word box after the program, simply type the word BOX and press the (STO) key.

A special note about the absolute movement command (M Command) is that you should not use it in the middle of a program. The reason being is that the move command tells the pen to go to an actual X and Y coordinate (that is, the command MX5Y1 will move the pen to X5, Y1). When scaling programs either larger or smaller than 100%, the M command therefore, is not affected and consequently your program will not be drawn correctly.

(RCL) register 30, (PRINT) and observe:

Perhaps you are not satisfied with the word BOX. Change the word BOX to HOUSE. You will recall that the pen move command at the end of the box program currently stored in register 30 was to move the pen so that the 3-lettered word BOX would be centered inside the symbol. However, you will be typing the 5-lettered word HOUSE inside the symbol; therefore, you will need to change line 90 which is the movement command.

Through this sequence, access register 30: press (RCL), and MEM RCL NO will be 30. Press (E), and using the arrow keys on the lower case portion of the (SIZE) and (SLOPE) keys, space over the program until you reach line 90. Change line 90 from X.3Y.45 to X.2Y.45. Since the only character you need to change is the 3, place the cursor under the 3 and type a 2 over it.

Using the arrow keys, continue spacing over the program until the cursor is positioned under the letter B of BOX. Simply change the word BOX to HOUSE by typing the word HOUSE. Since you have changed the stored program, you will need to press the (STO) key to tell the Scriber you are storing a new/changed program. To print the box (RCL) register 30 and press (PRINT). Your BOX should now be HOUSE.

We need to draw lettering size and slope to your attention. The lettering size we have been using is 0.138 inches and the slope is 90 . Both (SIZE) and (SLOPE) changes can be used in programming. Proceed with this lesson for some examples. Also, as a review of (SIZE) and (SLOPE) changes, you may need to review Chapter 4 Using the Function Keys, Section 4.2 Slope and Size, Linex Scriber Training Manual.

Lettering (SLOPE) can be changed in any program simply by accessing the program, entering the (E) (edit) mode, and spacing through the program until you have reached the wording-phase of the program. For example, let's change the slope on the word HOUSE in the program stored in register 30.

(RCL) register 30, (E), and space through the entire program until the cursor is located under the H in HOUSE. Change the (SLOPE) of the word by accessing the (SLOPE) key. Remember, your Scriber must be in upper case; i.e., red indicator light above the (SHIFT) key lit, and press the (SLOPE) key. Notice the display. An SL has come into the display, indicating a (SLOPE) change. Use a (SLOPE) of 75; therefore, press the 7 and 5 keys. As in regular (SLOPE) changes, you must access the function key to turn it off; consequently, press the (SLOPE) key, again remembering to be in upper case. Notice that another SL appears in the display. Type in the word HOUSE and (STO) the program.

(RCL) register 30, and (PRINT). You should print out the following:

(SIZE) changes can also be used in programming. Using an empty register, program the box by following the instructions below:

```
(STO) register 40
(f)(PRGM)
PG10 MX1Y.5
20 S
30 D
40 X1
50 Y1
60 X-1
70 Y-1
80 U
90 X.3Y.45PGBOX(STO)
```

Since the word BOX has been stored without changing the SIZE, the default SIZE value is equal to 0.138 inches. However, we want to change the lettering size to be 0.25 inches. First you need to access the program by pressing RCL register 40. Again, you will need to enter the edit mode by pressing the E, and spacing through the program until the cursor is located under the B in BOX. You access the SIZE key in the same manner you accessed the SLOPE key. Making sure your Scriber is in upper case, red indicator light above the SHIFT key on, press the SIZE key. Notice the display. An Si appears in the display, indicating a SIZE change. You need to key in your desired SIZE so press .25. Lock in this change by pressing SHIFT (if necessary) SIZE keys. Notice the Si after the numbers in the display. Now you are ready to type your text. Use the word BOX. You will need to STO this program, since you have changed it.

Let's check your success by pressing RCL register 40 PRINT. You should print out the following box.

Oops! I guess you forgot that SIZE changes also change your letter spacing. Well, you can fix that by once again entering the edit mode and changing your pen-up movement command. The pen movement command, line 90 of the program, should be X.15Y.4. You could simply type over that line since the total number of characters is equal to 7; however, we would prefer you to follow the instructions listed here so that you can utilize every aspect of editing, namely deleting and inserting characters.

After entering the edit mode, space across the program until the cursor is positioned under the 3 of line 90 X.3Y.45. Change the 3 to a 1 by pressing the 1 key. Now you need to add a 5, without typing over the Y. You will need to add a space and can do this through inserting, which is a g function above the STO key. Press g INS and notice the display. You should observe a space appearing between the 1 and the Y. Type the number 5. Since the inserting command is a part of the special functions, you will need to repress g INS to turn off or get out of this special function. Notice the display. The extra space after the number 5 has disappeared and the cursor is now

positioned under the Y. Space over the Y, the decimal point and the 4. When the cursor is under the 5, press the DEL key once. Notice the display. The number 5 is gone and the rest of the program was shifted over one space. Those were all the corrections needed to rectify the program so press the STO key.

RCL register 40 and PRINT. You should print out a square with the word BOX properly centered inside.

Some important points to summarize when changing the SIZE; SIZE changes alter both the letter's height and it's width. Make sure you have changed any pen-up movement commands to coincide with lettering SIZE changes, if you desire to have the wording centered.

A final point to remember in SIZE and SLOPE changes in programming is that they can both be changed, as they could in regular text printing.

8.10 Listing Your Programming Steps on Paper

To hardcopy any program on paper, you can tell your Scriber to print out the programming lines. (RCL) register 40. Before pressing (PRINT), you need to first press the alphabetic key (L) (for List). However, there are some points you should realize. First, you can print more lines if you put your Scriber in (VERT) mode. Also, you can print more lines if you decrease the text (SIZE). We suggest a text (SIZE) of 0.05 to 0.1 inches, unless you have a very lengthy program or a program with many arcs because of the arc command length.

For example, to hardcopy the box program stored in register 40, follow these commands. Press the (VERT) key, do a (HOME) command. To change the text (SIZE), press the (SIZE) key which is on the upper-case of the special yellow function keys. Type the (SIZE) to be .08. Press the (SIZE) key again to lock into this desired (SIZE) change. Get into the (MEM) by pressing the (MEM) key located on the lower-case portion of the key. (RCL) register 40, press (L) and (PRINT).

You should have printed out the following text.

```
LBL 10 mxly.5
20 s
30 d
40 xl
50 yl
60 x-l
70 y-l
80 u
90 x.15y.4"BOX
```

Obviously, it is printed sideways. If you want to change the printing, just turn the paper so that it will write in the vertical fashion. Also, if you do not have a very long program, there is no need to put the Scriber in the (VERT) mode.

8.11 Summary.

By now you should know the basics for programming your Scriber. In summary, once you have accessed the memory, you can (STO) , (RCL) , or (MEM) .

If you press (STO), you have two options. The options are:

1. (MEM) exits you from storing.
2. Select a register number. At this point, you can only enter text, (f) (PRGM) or (STO).

If you press (RCL), you must select a register number. Once the particular register is (RCL), you have six options. You have the ability to:

1. (PRINT)
2. (RCL) - allows you to access another register
3. (STO)
4. (E) - edit
5. (L) - list
6. (S) - scale

If you press (MEM), you will exit the memory.

8.12 Conclusion.

You have just mastered everything in programming. For any program you desire to produce, you have all the resources in this section available. We wish you luck in your programming attempts and offer our help should you need it. Our

Toll Free Number: 1-800-241-3675 Inside Georgia: 404-448-0977

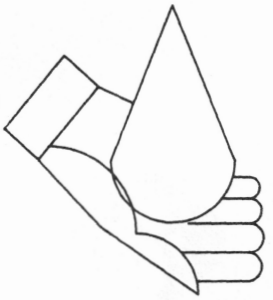
We encourage you to share your programs with us and other clients. Please send your hard copied programs to:

A.D.S./Linex., Inc.
3130 Gateway Drive
Suite 400
Norcross, GA 30071

Appendix

xibnəqqA

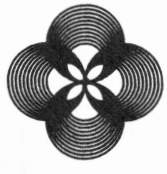
```
10 mx2y1.2
20 s
30 d
40 x.62y.75
50 x.35y-.32
60 x-.62y-.75
70 x-.35y.32
10 d
20 x.35y-.32
30 x.65y-.7
40 x1y-.7
50 c1x-.64y.64
60 c1x-.9y.9
10 x1.55y-1.4
20 d
30 x.5
40 c1x.15y.15
50 c1x-.15y.15
55 x-.68
10 x.7
20 d
30 c1x.15y.15
40 c1x-.15y.15
50 x-.63
60 x.63
70 c1x.13y.13
80 c1x-.13y.13
90 x-.27
100 x.27
110 c1x.11y.11
120 c1x-.11y.11
125 x-.15
10 y.17
20 d
30 crx-.64y-.64
40 crx-.64y.64
50 x.64y1.6
60 x.64y-1.6
10 x-1.4y.75
20 d
30 x.35y-.16
```



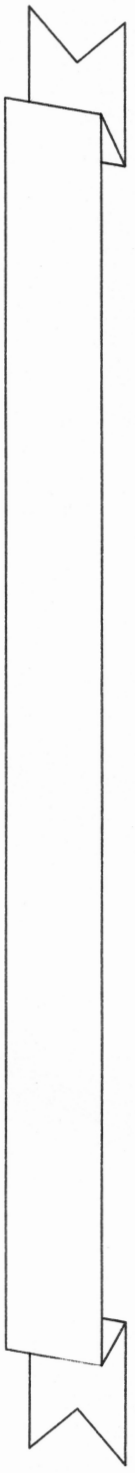
Scaled to 50%

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 MXIYI
20 D
30 CX.10
40 CX.11
50 CX.12
60 CX.13
70 CX.14
80 CX.15
90 CX.16
100 CX.17
110 CX.18
120 CX.19
130 CX.2
140 CX-.2
150 CX-.19
160 CX-.18
170 CX-.17
180 CX-.16
190 CX-.15
200 CX-.14
210 CX-.13
220 CX-.12
230 CX-.11
240 CX-.1
250 CY.1
260 CY.11
270 CY.12
280 CY.13
290 CY.14
300 CY.15
310 CY.16
320 CY.17
330 CY.18
340 CY.19
350 CY.2
360 CY-.2
370 CY-.19
380 CY-.18
390 CY-.17
400 CY-.16
410 CY-.15
420 CY-.14
430 CY-.13
440 CY-.12
450 CY-.11
460 CY-.1
470
```

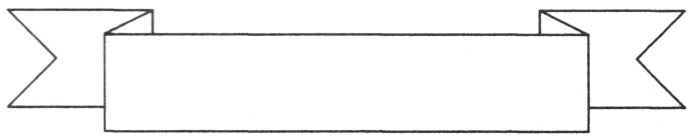


```
R10 mx7.50y.75
```



```
R10 mx7.50y.750
20 s
30 d
40 y-.50
50 x-6.50
60 y.50
70 x6.50
80 x-.250y.125
90 y-.125
100 y.125
110 x.750
120 x-.250y-.250
130 x.250y-.250
140 x-.50
150 u
160 x-6.50
170 d
180 x-.50
190 x.250y.250
200 x-.250y.250
210 x.750
220 y-.125
230 y.125
240 x-.250y-.125
250 uR
```

```
R10 mx3.00y.50
20 s
30 d
40 y-.50
50 x-2.50 G-50
60 y.50
70 x2.50 G-50
80 x-.250y.125
90 y-.125
100 y.125
110 x.750
120 x-.250y-.250
130 x.250y-.250
140 x-.50
150 u
160 x-2.50 G-50
170 d
180 x-.50
190 x.250y.250
200 x-.250y.250
210 x.750
220 y-.125
230 y.125
240 x-.250y-.125
250 uR
```



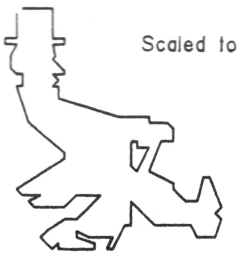
Programmed by:
Bob Hunt
Boeing Company

```
R10 d
20 x.0625
30 x.0625y.125
40 x.125y.0625
50 x.0625y-.0625
60 x.125y.0625
70 x.0625
80 y-.0625
90 clx.125y.125
100 y-.0625
110 x.125
120 x.125y.0625
130 x.0625y-.0625
140 x.0625y.0625
150 x.125y-.0625
160 x.125y.125
170 x.0625
180 x.0625y-.125
190 x.1875
200 y.0625
210 x.125y.125
220 x.0625
230 x.125y.500
240 x.125y.125
250 x.0625y.125
260 y.125
270 x-.125y.1875
280 x.1875y.0625
290 x.3125y-.125
300 x.1875y-.250
310 x-.0625y-.125
320 x.125y-.125
330 y-.0625
340 x.0625
350 x.125y-.250
360 x.0625y.125
370 x.0625
380 x-.0625y-.125
390 x.1875y.125
400 x.1875y-.0625
410 y-.0625
420 x-.125y-.0625
430 x-.125y-.125
440 x.1875y-.125
450 x.0625
460 x.0625y-.0625
470 y-.0625
480 x.125y.0156
490 y-.0156
500 x.250
510 y-.0625
520 x-.1875
530 x.0625y-.0625
540 x.125y-.0625
550 y-.1875
560 x-.0625
570 y.0625
580 x-.0625y.0156
590 x-.1875y.0156
600 x-.0625y-.125
610 y-.1875
620 x.0625y-.125
630 x-.0625y-.0625
640 y-.0625
650 x-.375y.125
660 x-.375y.0625
670 x-.375
680 x-.4375y.0625
690 x-.0625y.0625
700 x-.0625
710 x-.1875y-.0625
720 x-.1875y.0625
730 y-.125
740 x-.0625y-.125
750 x-.250y-.0625
760 x-.156
770 x.031
780 crx.031y.031
790 x.109
800 y.156
810 x.0625y-.0625
820 x.125
830 y.125
840 x-.0625y.0625
850 crx-.125y-.125
860 x-.125y.125
870 x-.125y-.0625
880 x-.250y.125
890 x-.125y-.0625
900 x-.250y.125
910 crx-.125y.125
920 y.156
930 u
940 xl.312
950 d
960 x.0625
970 y.0625
980 x.250y.0625
990 x.0625y.0625
1000 y-.1875
1010 x-.125y.0625
1020 x-.125
1030 x-.125y-.125
1040 x-.0625
1050 y.0625
1060 x.0625
1070 uR
```

Scaled to 50%

Programmed by:
Bob Hunt
Boeing Company

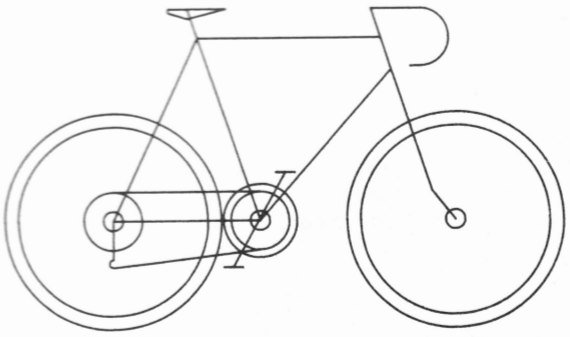
```
%10 mx2y1.7
15 s
20 d
30 y-.250
40 x-.125
50 y-.0625
60 x.125
70 x-.0625y-.125
80 y-.125
90 x.0625y-.0625
100 x.0625
110 y-.125
120 x-.0625
130 x.125y-.375
140 x.375y-.313
150 y-.0625
160 x-.500y-.313
170 x.0625y-.0625
180 x.1875
190 x-.125y-.0625
200 x.0625y-.0625
210 x.313
220 x.125y.125
230 x.250
240 x-.250y-.250
250 x-.125
260 x-.1875y-.125
270 x-.0625y-.0625
280 x.125y-.125
290 x.0625y.0625
300 y-.0625
310 x.375
320 y.0625
330 x-.1875y.0625
340 y.0625
350 x.125y-.0625
360 x.250
370 x-.0625y-.125
380 x.0625
390 x.125y.250
400 x.0625
410 y.250
420 x.250y-.250
430 x.375
440 x.0625y-.125
450 x.1875
460 x.0625y.1875
470 x-.0625y.0625
480 x.0625y.0625
490 x-.125y.313
500 x-.0625
510 x-.0625y-.250
520 x-.125
530 x-.125y.125
540 y.0625
550 x-.250y.125
560 x.125y.313
570 x.125
580 y.125
590 x-.0625y.0625
600 x-.1875
610 y.0625
620 x-.313
630 x-.6250y.1875
640 y.125
650 x-.0625
660 x.0625y.0625
670 x-.0625y.0625
680 x.125
690 y.0312
700 x-.125y.125
710 x.0312y.0312
720 x-.031y.125
7307 x.125
740 y.0625
750 x-.125
760 y.313
770 x-.313
780 u
790 x1.125y-1.625
800 d
810 x.0625y-.0625
820 x.125y.250
830 x-.125
840 y.0625
850 x-.0625
860 y-.250%
```



Scaled to 50%

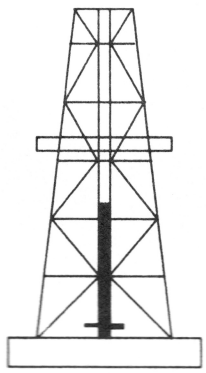
Programmed by:
Bob Hunt
Boeing Company

```
10 mx.5y.75
20 s
30 d
40 cx.56
50 u
60 x.07
70 d
80 cx.49
90 u
100 x1.7
110 d
120 cx.56
130 u
140 x.07
150 d
160 cx.49
170 u
180 x-.71
190 d
200 cx.19
210 u
220 x.14
230 d
240 cx.05
250 u
260 x.05
270 d
280 x-.32y.95
290 x-.44y-.95
300 x.76
310 x.68y.78
320 u
330 x-1y.17
340 d
350 x.95
360 u
370 x-.05y.15
380 d
390 x.31y-.95
400 x.12y-.15
410 u
420 x-.43y1.1
430 d
440 x.25
450 crx.15y-.15
460 crx-.15y-.15
470 x-.05
480 u
490 x-1.1y.15
500 d
510 x-.05y.15
520 x-.1
530 y-.02
540 x.1y-.03
550 x.2y.05
560 x-.2
570 u
580 x.50y-.85
590 d
600 x-.27y-.49
610 x-.05
620 x.1
630 u
640 x.22y.49
650 d
660 x-.05
670 x.1
680 u
690 x-.99y-.25
700 d
710 cx.05
720 u
730 x-.1
740 d
750 cx.15
760 u
770 x.76
780 d
790 cx.15
800 u
810 x1.11
820 d
830 cx.05
840 u
850 x-1.72
860 d
870 y-.2
880 clx-.02y-.02
890 clx.02y-.02
900 x.76y.09
910 u
920 x-.76y.3
930 d
940 x.76
950 u
```



Programmed by:
Robert Babbs
City of Cincinnati

```
R10 mx2y.2
20 s
30 d
40 x1
50 y-.15
60 x-1
70 y.15
80 x.15
90 x.2y1.7
100 x.3
110 x.2y-1.7RR10 d
20 x-.32
30 y1.7
40 x-.06
50 y-1.7RR10 d
20 x.01
30 y.7
50 x.01
60 y-.7
70 x.01
80 y.7
90 x.01
100 y-.7RR10 d
20 x.01
30 y.7
40 x.01
50 y-.7
60 x-.03
70 y.05
80 x.1
90 y.01
100 x-.2
110 y.01
120 x.2RR10 x-.1y.9
20 d
30 x-.35
40 y.07
50 x.7
60 y-.07
70 x-.35RR10 x-.3y-.65
20 d
30 x.62
40 u
50 x-.035y.3
60 d
70 x-.54
80 u
90 x.03y.3
100 d
110 x.48
120 u
130 x-.035y.3
140 d
150 x-.42
160 u
170 x.035y.3
180 d
190 x.33RR10 x-.50y-1.52
20 d
30 x.32y.32
40 x-.25y.3
50 x.24y.3
60 x-.17y.3
70 x.17y.3
80 x-.12y.18RR10 x.5y-1.7
20 d
30 x-.32y.32
40 x.25y.3
50 x-.24y.3
60 x.17y.3
70 x-.17y.3
80 x.11y.18
90 R
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

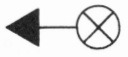
```
R10 MX.5Y.5
20 S
30 D
40 CX.2
49 U
50 X.2Y.2
51 D
52 X.17Y-.3
53 X-.34
54 X.17Y.3R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
G10 MX.5Y.5
20 S
30 D
40 X.15Y.15
50 X-.075Y-.075
60 X-.075Y.075
70 X.15Y-.15
80 U
90 X-.18Y.15
100 Y-.08
101 D
110 CX.11
120 Y.11
200 X.22
201 Y-.22
202 X-.22
203 Y.11G
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 R.18S1 RR10 D
20 CX.11
30 U
40 X.11
41 D
50 X-.075Y.075
60 X.15Y-.15
70 X-.075Y.075
80 X.075Y.075
90 X-.15Y-.15
100 R
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

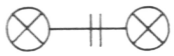
```
R10 MX.5Y.5
20 S
30 D
40 X.15Y.15
50 X-.075Y-.075
60 X-.075Y.075
70 X.15Y-.15
80 U
90 X-.18Y.15
100 Y-.08
101 D
110 CX.11
120 R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 D
40 X.15Y.15
50 X-.075Y-.075
60 X-.075Y.075
70 X.15Y-.15
80 U
90 X-.18Y.15
100 Y-.08
101 D
110 CX.11
120 U
121 X.22
122 D
123 X.4
130 CX.11
131 U
132 X.11
133 D
124 X-.075Y.075
125 X.15Y-.15
126 X-.075Y.075
127 X.075Y.075
128 X-.15Y-.15
129 U
140 X-.2Y.08
142 D
143 X.1Y.1
144 X-.1Y-.1
145 X.1Y-.1R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 D
40 X.15Y.15
50 X-.075Y-.075
60 X-.075Y.075
70 X.15Y-.15
80 U
90 X-.18Y.15
100 Y-.08
101 D
110 CX.11
120 U
121 X.22
122 D
123 X.4
130 CX.11
131 U
132 X.11
133 D
124 X-.075Y.075
125 X.15Y-.15
126 X-.075Y.075
127 X.075Y.075
128 X-.15Y-.15
129 U
150 X-.22Y.07
151 D
152 Y.08
153 Y-.16
154 U
155 X.05
156 D
157 Y.16R
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 D
40 X.15Y.15
50 X-.075Y-.075
60 X-.075Y.075
70 X.15Y-.15
80 U
90 X-.18Y.15
100 Y-.08
101 D
110 CX.11
120 U
121 X.22
122 D
123 X1
130 CX.11
131 U
132 X.11
133 D
124 X-.075Y.075
125 X.15Y-.15
126 X-.075Y.075
127 X.075Y.075
128 X-.15Y-.15
129 R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
PG10 mX1Y1
20 S
40 PGSi.1SiPG10 X-.02
20 D
30 X-.26
40 CX-.07
50 U
60 X-.07
70 X-.05Y-.05
80 D
90 X-.03Y-.03
100 u
101 x.13y.13
102 d
103 x.03y.03
104 u
105 x-.08y-.08
106 x-.05y.05
107 d
108 x-.03y.03
109 u
110 x.13y-.13
111 d
112 x.03y-.03
40 s
50 u
60 x-.1y.04PGSi.08SiS
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

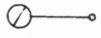
```
RI0 MXIYI
20 S
30 RSi.ISiRI0 X-.02
20 D
30 X-.26
40 CX-.07
50 U
60 X-.07
70 D
80 X-.08Y.08
90 X.16Y-.16
100 X-.08Y.08
110 X-.08Y-.08
120 x.16y.16R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 mx.5y.5
20 s
30 d
40 cx.06
50 u
60 x.12
70 d
80 x.06
90 u
100 x.04
110 d
120 x.06
130 u
131 x.04
132 d
140 x.05
141 u
142 x.02
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 mx.5y.5
20 s
30 d
40 cx.06
50 u
60 x.12
70 d
80 x.3
90 u
100 x.02
110 R5.105R10 x-.35y.05
20 d
30 x-.06y-.1R
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 mx.5y.5
20 s
30 d
40 y.08
50 x-.15y-.04
60 x.15y-.04
70 y.04
80 x.13
90 cx.07
100 u
110 x.07
120 d
130 x-.05y.05
150 x.1y-.1
160 x-.05y.05
170 x-.05y-.05
180 x.1y.1
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 mx.5y.5
20 s
30 d
40 y.08
50 x-.15y-.04
60 x.15y-.04
70 y.04
80 x.15
90 cx.07
100 u
110 x.04y-.04x.08x.08M
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

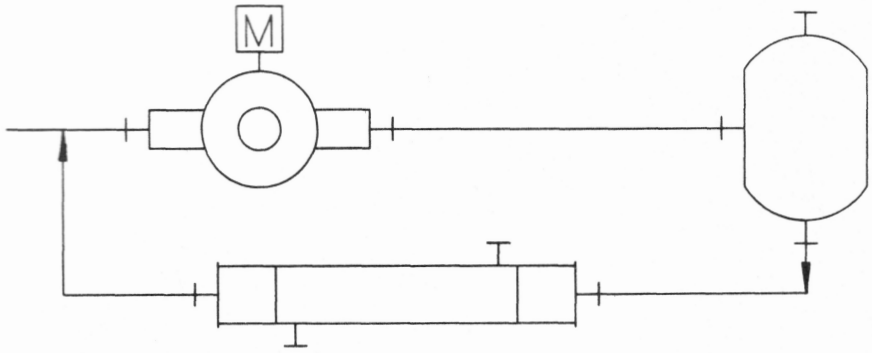
```
R10 MX.5Y.5
20 S
21 D
30 CX.1
40 CX.095
50 CX.090
60 CX.085
70 CX.080
80 CX.075
90 CX.070
100 CX.065
110 CX.060
120 CX.055
130 CX.05
131 CX.045
132 CX.040
133 CX.035
134 CX.030
135 CX.025
136 CX.02
137 CX.015
138 CX.010
139 CX.009R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

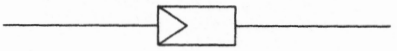
```
810 MX3Y1.3
20 S
30 D
40 X-.3
50 X.62
60 Y.06
70 Y-.12
80 Y.06
90 X.12
100 Y.1
110 X.28
120 X-.28
130 Y-.2
140 X.28
150 U
160 X-.01Y.1
170 D
180 CX.3
190 CRX.3Y.3
200 Y.1
210 X.12
220 Y.24
230 X-.24
240 Y-.24
250 X.12
260 U
270 Y-.29
280 D
290 CY-.11
300 U
310 Y-.11[illegible]10 X.29Y.1
20 D
30 X.28
40 Y-.2
50 X-.28
60 X.28
70 Y.1
80 X.12
90 Y.06
100 Y-.12
110 Y.06
120 X1.7
130 Y.06
140 Y-.12
150 Y.06
160 X.12
170 Y.3
180 CRX.318Y.180L318J.194R.374
190 Y.12
200 X.06
210 X-.12
220 X.06
230 Y-.12
240 CRX.318Y-.180R.374
250 Y-.6
260 CRX-.318Y-.180L318J.194R.374
270 Y-.12
280 X.06
290 X-.12
300 X.06
310 Y.12
320 CRX-.318Y.180R.374
330 Y.3
340 Y-.3
350 CLX.318Y-.180L318J.194R.375
360 Y-.38
370 X-.02Y.16
380 X.04
390 X-.02Y-.16
400 X-.01Y.16
410 X.02
420 X-.005Y-.08
430 Y-.08
440 X-1.08
450 Y.06
460 Y-.12
470 Y.06
480 X-.12
490 Y.17
500 Y-.02
510 X-.4
520 Y.12
530 X.06
540 X-.12
550 X.06
560 Y-.12
570 X-1.45
580 Y.02
590 Y-.34
600 Y.02
610 X.3
620 Y.3
630 Y-.3
640 X.1
650 Y-.12
660 X.06
670 X-.12
680 X.06
690 Y.12
700 X1.15
710 Y.3
720 Y-.3
730 X.3
740 Y-.02
750 Y.17
760 U
770 X-1.85
780 D
790 X-.12
800 Y.06
810 Y-.12
820 Y.06
830 X-.68
840 Y.86
```

```
850 X-.02Y-.16
860 X.04
870 X-.02Y.16
880 X-.01Y-.16
890 X.02
900 X.005Y.08[illegible]10 X.935Y.51[illegible]9.18[illegible]M
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

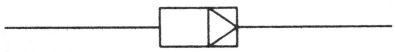


```
R10 MX.5Y.5
20 S
30 D
40 X.8
50 Y.1
60 X.4
70 Y-.2
80 X-.4
90 Y.2
110 X.15Y-.1
120 X-.15Y-.1
121 Y.1
122 U
123 X.4
124 D
125 X.8R
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 D
40 X.8
50 Y.1
60 X.4
70 Y-.2
80 X-.4
90 Y.1
100 U
110 X.4
120 D
130 X-.15Y.1
140 Y-.2
150 X.15Y.1
160 X.8R6
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 D
40 X.2
50 U
60 X.08
70 D
80 X.7
90 Y.2
100 X.3Y-.2
110 X-.3Y-.2
120 Y.2
130 U
140 X.2
51 D
150 Y.07
160 Y-.14
170 Y.07
180 U
190 X.1
200 D
210 X.7
220 U
230 X.07
240 D
250 X.2
260 U
261 X-1.24Y-.08
126 R54.154A
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

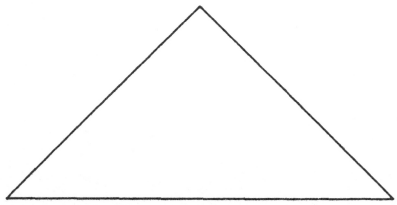
```
10 MX.5Y.5
20 S
30 D
40 X.25
50 U
60 X.1
70 D
80 X.25
90 U
100 X.1
110 D
120 X.25
130 Y.1
140 X.2
150 Y-.2
160 X-.2
170 Y.1
180 U
190 X.2
200 D
210 X.25
220 U
230 X.1
240 D
250 X.25
260 U
270 X.1
280 D
290 X.25
300 U
301 X-1.12Y-.03
302 %4.08%20
```


Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
%10 MX.5Y.5
20 S
30 D
40 X.25
50 U
60 X.1
70 D
80 X.25
90 U
100 X.1
110 D
120 X.25
121 U
122 Y-.1
130 %5.30%0%10 U
20 X-.1Y.1
30 D
40 X.25
50 U
60 X.1
70 D
80 X.25
90 U
100 X.1
110 D
120 X.25
121 U
122 X-1.14Y-.04%5.10%20
```


Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
R10 MX.5Y.5
20 S
30 D
40 X1.Y1.
50 X1.Y-1.
60 X-2
70 UR
```



```
RI0 mx2yl
20 s
30 d
40 cx.3
50 u
60 x.02
70 d
80 cx.28
90 u
100 x.065y.17
110 d
120 x.4y-.37
130 x.04y.04
140 x-.4y.38
150 x-.04y-.04
160 x.4y-.37
170 x.03y.03
180 x-.39y.37
190 x-.03y-.03
200 x.39y-.36
210 x.02y.02
220 x-.38y.36
230 x-.019y-.019
240 x.38y-.35
250 x.009y.009
260 x-.37y.35
270 x-.007y-.007
280 x.37y-.345RRI0 x.03y.33
20 d
30 x-.4y-.37
40 x-.04y.04
50 x.4y.38
60 x.04y-.04
70 x-.4y-.37
80 x-.03y.03
90 x.39y.37
100 x.03y-.03
110 x-.39y-.36
120 x-.02y.02
130 x.38y.36
140 x.019y-.019
150 x-.38y-.35
160 x-.009y.009
170 x.37y.35
180 x.007y-.007
190 x-.37y-.345RRI0 x-.035y.12RS4.12S4RRI0 x.27RR
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 MX1Y.2
20 S
30 D
40 Y.8
50 X1Y-.4
60 X-1Y-.4
70 U
80 X.03Y.05
90 D
100 Y.7
110 X.87Y-.35
130 X-.87Y-.35▯▯10 x.06y.45▯▯.09▯NO▯10 x-.17y-.13▯PASSING▯10 x-.53y-.13▯ZONE
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

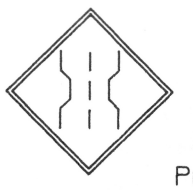
```
R10 mx2y1.9
20 s
30 d
40 x-.43y-.43
50 x.43y-.43
60 x.43y.43
70 x-.43y.43
80 u
90 y-.03
100 d
110 x-.4y-.4
120 x.4y-.4
130 x.4y.4
140 x-.4y.4RR10 x-.1y-.3
20 d
30 x.15
40 x.06y-.12
50 x-.15
60 x-.06y.12RR10 x.01y.06
20 d
30 c1x-.02y-.02
40 c1x.02y-.02
50 x-.08y-.13
52 x-.02y-.02
55 u
56 x-.07
59 d
61 cx.07RR10 x.3
20 d
30 cx.07RR10 y.12
20 d
30 y.03
40 x.02
50 x-.04
60 x.02
70 y-.03
80 x-.1y-.12
90 y.03
100 y-.05R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

100%

200%

```
10 MX2Y1.9
20 S
30 D
40 X-.43Y-.43
50 X.43Y-.43
60 X.43Y.43
70 X-.43Y.43
80 U
90 Y-.03
100 D
110 X-.4Y-.4
120 X.4Y-.4
130 X.4Y.4
140 X-.4Y.4
145 u
150 y-.2
10 d
20 y-.09
30 u
40 y-.06
50 d
60 y-.09
70 u
80 y-.06
90 d
100 y-.09
110 u
120 x-.15
130 d
140 y.1
150 x.05y.05
160 y.1
170 x-.05y.05
180 y.1
190 u
200 x.3
205 d
210 y-.1
220 x-.05y-.05
230 y-.1
240 x.05y-.05
250 y-.1
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
RI0 MX2YI.9
20 S
30 D
40 X-.43Y-.43
50 X.43Y-.43
60 X.43Y.43
70 X-.43Y.43
80 U
90 Y-.03
100 D
110 X-.4Y-.4
120 X.4Y-.4
130 X.4Y.4
140 X-.4Y.4
145 u
150 x-.03y-.14RRI0 d
20 y-.08
30 x-.12
40 y-.07
50 x.12
60 y-.33
70 x.07
80 y.08
90 x.12
100 y.07
110 x-.12
120 y.33
130 x-.07RRI0 d
20 x.01
30 y-.09
40 x-.12
50 y-.05
60 x.12
70 y-.33
80 x.05
90 y.08
20 x.12
110 y.05
120 x-.12
130 y.33
140 x-.05RRI0 d
20 x.01
30 y-.09
40 x-.12
50 y-.03
60 x.12
70 y-.33
80 x.03
90 y.08
100 x.12
110 y.03
120 x-.12
130 y.33
140 x-.03RRI0 d
20 x.01
30 y-.09
40 x-.12
50 y-.01
60 x.12
70 y-.33
80 x.01
90 y.08
100 x.12
110 y.01
120 x-.12
130 y.33
140 x-.01R
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 MX1Y1.5
20 S
30 D
40 X-.43Y-.43
50 X.43Y-.43
60 X.43Y.43
70 X-.43Y.43
80 U
90 Y-.03
100 D
110 X-.4Y-.4
120 X.4Y-.4
130 X.4Y.4
140 X-.4Y.4
145 u
150 x-.2y-.34R4.11STOPR10 X-.47Y-.18RAHEAD
```

Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

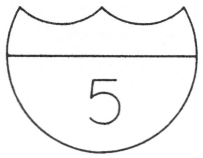
```
10 MX1Y1
20 S
30 D
40 X.125
50 X.03Y-.1
60 X.03
70 X-.03
80 X-.03Y.1
90 X-.125
100 X-.03Y.155
110 CX.03
115 U
116 X.020RS1.2SR10 X-.020
20 D
120 X.03Y-.12
130 X.1
140 X-.1
150 U
160 X-.03
170 D
180 CLX-.10Y-.10
190 CLX.10Y-.10
200 CLX.10Y.10R
```

```
%10 MX1Y1
20 S
30 D
40 X.125
50 X.03Y-.1
60 X.03
70 X-.03
80 X-.03Y.1
90 X-.125
100 X-.03Y.155
110 CX.03
120 X.03Y-.12
130 X.1
140 X-.1
150 U
160 X-.03
170 D
180 CLX-.10Y-.10
190 CLX.10Y-.10
200 CLX.10Y.10%
```

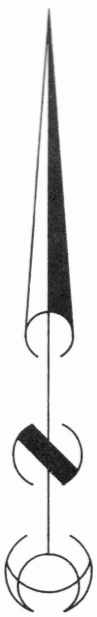
```
10 MXOYO
20 D
30 X6.0
40 Y1.95
50 X-6.0
60 Y-1.95
70 mx.05y1.8PSi.12OSiSt75StPART NO.          LENGTH          HEIGTH          WIDTHR10 Y-.05
20 D
30 X-5.9R
```

PART NO.	LENGTH	HEIGTH	WIDTH

```
R10 MX2Y.5
20 S
30 D
40 CRX-.5Y.5
50 CRX.067Y.250R.5
60 CLX.212Y-.088I.212J.212R.30
70 CLX.212Y.088R.30
80 CLX.212Y-.088I.212J.212R.30
90 CLX.212Y.088R.30
100 CRX.067Y-.250I.433J.250R.5
110 CRX-.5Y-.5
120 u
130 x-.47y.5
140 d
150 x.97
160 u
170 x-.55y-.35R%.25%%90%5
```

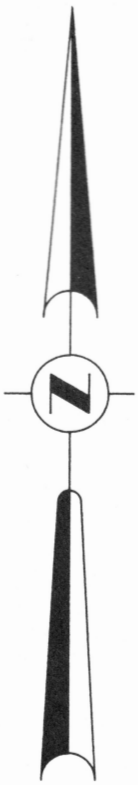


```
10 mxly.8
20 s
30 d
40 x2.78
50 crx.16y.16
60 crx.1385y-.08r.16
70 clx-.206y.145i.206j.075r.22
80 clx-.19y-.11r.22
90 u
100 x.097y-.115
110 d
120 clx.16y-.16
130 clx.1385y.08r.16
140 crx-.206y-.145i.206j.075r.22
150 crx-.19y.11r.22
160 u
170 x.144y-.103
180 d
190 clx.152y.216i.078j.216r.23
200 clx-.152y.216r.23
210 u
220 x-.72y-.14
230 d
240 crx.154y.099i.154j.071r.17
250 crx.154y-.099r.17
260 u
270 y-.16
280 d
290 crx-.154y-.099i.154j.071r.17
300 crx-.154y.099r.17
310 x.23y.23
320 x.008y.008
330 x-.24y-.24
340 x.006y-.006
350 x.24y.24
360 x.006y-.006
370 x-.24y-.24
380 x.006y-.006
390 x.24y.24
400 x.006y-.006
410 x-.24y-.24
420 x.006y-.006
430 x.24y.24
440 x.006y-.006
450 x-.24y-.24
460 x.006y-.006
470 x.24y.24
480 x.006y-.006
490 x-.24y-.24
500 x.006y-.006
510 x.24y.24
520 x.006y-.006
530 x-.24y-.24
540 x.006y-.006
550 x.24y.24
560 x.006y-.006
570 x-.24y-.24
580 u
590 x-.42y.1
600 d
610 crx-.108y-.063i.108j.062r.125
620 crx-.125y.125
630 crx.125y.125
640 crx.108y-.063r.125
650 u
660 x-.1y-.187
670 d
680 x-1.7y.123
690 x1.7y.127
700 x-1.54y-.125
710 x1.41
720 x-.01y.01
730 x-1.3
740 x1.36y.098
750 x-.01y-.01
760 x-1.2y-.09
770 x.01y.01
780 x1.14
790 x.01y.01
800 x-.88
810 x.01y.01
820 x.87
830 x.01y.01
840 x-.7
850 x.01y.01
860 x.69
870 x.01y.01
880 x-.38
890 x.01y.01
900 x.37
910 x.01y.01
920 x-.2
```

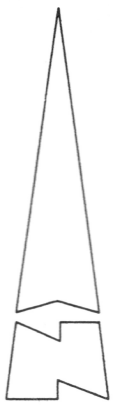


Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.

```
10 mxly.7
20 s
15 d
30 Xl.8
40 CX.2
50 U
60 X.2Y.2
70 D
80 Y.13
90 U
100 Y-.54
110 D
120 Y-.13
130 U
140 X.1Y.24
150 D
160 X-.2
170 X.115Y.2
180 U
190 X-.115
200 D
210 X.2
220 X-.115Y-.2
230 X-.011
240 X.115Y.2
250 X-.011
260 X-.115Y-.2
270 X-.011
280 X.115Y.2
290 X-.011
300 X-.115Y-.2
z
```



```
10 mxlyl
20 s
30 d
40 xl.57y.215
50 x-.06y-.216
60 x.06y-.216
70 x-1.57y.215
80 u
90 xl.62y.217
100 d
110 x.40y.05
120 x-.1y-.265
130 x.1
140 y-.267
150 x-.40y.05
160 x.1y.23
170 x-.1
180 y.20
```

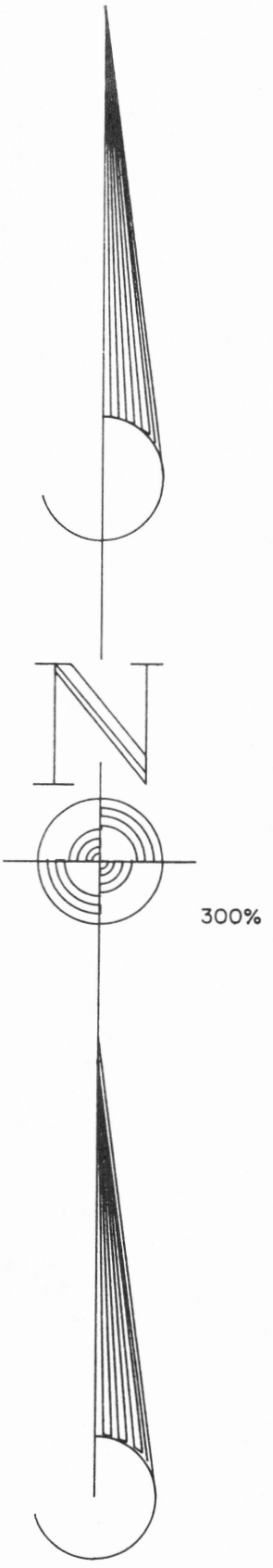


```
B10 mx.5y.95
20 s
30 d
40 xl.3
50 x-.55y.12
60 x-.12y.55
70 x-.12y-.55
80 x-.55y-.12
90 x.55y-.12
100 x.12y-.55
110 x.12y.55
120 x.55y.12
130 x-.56y.108
140 x-.013y-.013
150 x.52y-.09
160 x-.53y.08
170 x-.013y-.013
180 x.49y-.068
190 x-.505y.055
200 x-.013y-.013
210 x.44y-.038
220 x-.452y.025
230 x-.013y-.013
240 x.36y-.008
250 x-.38y-.005
260 u
270 x-.002y.66
280 d
290 y-1.32
300 x.108y.53
310 x-.013y.013
320 x-.09y-.52
330 x.08y.52
340 x-.013y.013
350 x-.068y-.49
360 x.055y.504
370 x-.013y.013
380 x-.038y-.44
390 x.025y.451
400 x-.013y.013
410 x-.008y-.36
420 x.002y.38
430 u
440 x-.14y.14
450 d
460 x.24y-.24
470 u
480 x-.24
490 d
500 x.24y.24
510 u
520 x-.12y.55
530 d
540 x-.108y-.56
550 x.013y-.013
560 x.09y.52
570 x-.08y-.53
580 x.013y-.013
590 x.068y.49
600 x-.055y-.505
610 x.013y-.013
620 x.039y.44
630 x-.025y-.452
640 x.013y-.013
650 x.008y.4
660 x.006y-.41
670 u
680 x-.645y-.005
690 d
700 x.55y-.109
710 x.013y.013
720 x-.52y.09
730 x.53y-.08
740 x.013y.013
750 x-.49y.068
760 x.505y-.055
770 x.013y.013
780 x-.44y.038
790 x.452y-.025
800 x.013y.013
810 x-.37y.008
820 x.38y-.003
830 u
840 x-.89y-.07B$4.32$wB10 x.52y.78B$4.22$NB10 X.59Y-.80BEB10 X-1Y-.8;B$
```

Programmed by:
Jeff Pahle
A.D.S./Linex, Inc.

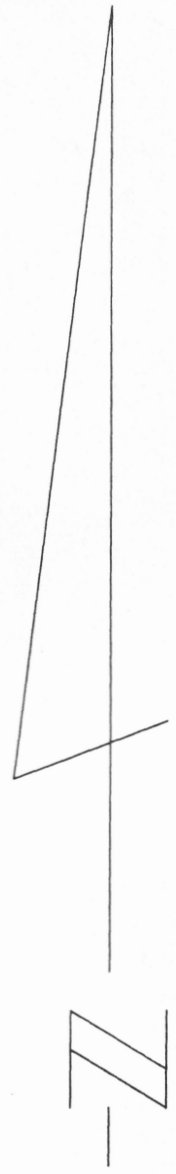
```
10 MX.2YI
20 S
30 D
40 XI.215
50 U
60 X.195
70 D
80 XI.365
90 U
100 X.036Y-.111
110 D
120 CLX.081Y.1111.034J.111R.115
130 CLX-.115Y.115
140 CLX-.115Y-.115
150 CRX.115Y.115
160 X-.855Y-.115
170 U
180 X-.33Y-.18
190 D
200 Y.36
210 Y-.063
220 CY-.117
230 Y-.017
240 CLX-.1Y-.1
250 X.016
260 CRX.084Y.084
270 Y-.016
280 CLX-.067Y-.067
290 X.007
300 CLX.06Y-.06
310 Y.016
320 CRX-.043Y.043
330 X.016
340 CLX.027Y-.027
350 Y.012
360 CRX-.015Y.015
370 X.015
380 Y.015
390 CRX.015Y-.015
400 X.012
410 CLX-.027Y.027
420 Y.016
430 CRX.043Y-.043
440 X.016
450 CLX-.06Y.06
455 U
460 X.06Y-.06
470 X.007
475 D
480 CRX-.067Y-.067
490 Y-.016
500 CLX.084Y.084
510 X.016
520 CRX-.1Y-.1
530 U
540 X-.14Y-.027
550 D
560 Y.075
570 Y-.037
580 X-.225
590 Y-.037
600 Y.067
610 X.172Y.142
620 X.052
630 X-.21Y-.172
640 X-.015
650 X.204Y.172
660 X-.204
670 Y-.03
680 Y.06
690 U
700 X-.31Y-.227
710 D
720 CLX.081Y.1111.034J.111R.115
730 CLX-.115Y.115
740 CLX-.115Y-.115
750 CRX.115Y.115
760 X-.88Y-.115
770 U
780 MX.2YI
790 S
800 D
810 X.765Y.015
820 X.005Y.015
830 X-.77Y-.03
840 X.775Y.045
850 X.005Y.015
860 X-.78Y-.06
870 X.79Y.075
880 X.01Y.015
890 X-.8Y-.09
900 X.815Y.1
910 U
920 XI.15Y-.097
930 D
940 X.695Y.015
950 X.005Y.015
960 X-.7Y-.03
970 X.705Y.045
980 X.005Y.015
990 X-.71Y-.06
1000 X.72Y.075
1010 X.01Y.015
1020 X-.73Y-.09
1030 X.745Y.1
1040 U
1050 MX.2YIR
```

100%



300%

```
R10 mx8y1
20 s
30 d
40 x-5
50 x4y-.5
60 x-.3y.8
70 u
80 x1.5
90 d
100 x.5RR10 d
20 x-.2
30 x-.3y-.5
40 x.5
50 x-.3
60 x.3y.5
70 RR10 y-.3
20 d
30 x.3
40 u
50 x.3y-.2R
```



Programmed by:
Lee Quarnstrom
A.D.S./Linex, Inc.